



# The McGill Daily

## science edition

When the eminent English "scientist-at-large" Sir Francis Galton died in 1911, he bequeathed £45,000 to London University for the study of "eugenics." Years earlier, he had coined this term to describe a new science — one which would provide a "body of scientific knowledge by which men could rationally direct the course of human evolution."

The effect of these and similar ideas was both widespread and influential. In 1859 when Galton's cousin, Charles Darwin, published *The Origin of Species*, the theory of evolution sparked a fundamental revision of beliefs about the stability of the human form. Cross-bred with Mendel's experimental results in the field of heredity, men like Galton began to formulate a compelling vision of an engineered utopia.

But the meteoric rise of eugenics in the scientific community was accompanied by a surprisingly abrupt decline in popularity in the 20th century. Herbert Spencer, whose "synthetic philosophy" dominated American universities from 1860-90, was easily one of the most important intellectuals in the world during his lifetime. Years later, his "survival of the fittest" theories are regarded as a misdirected, unscientific attempt "to found a metaphysical system on naturalistic principles" at best, and more commonly as a form of sinister proto-totalitarianism.

The rise and fall of eugenics, as well as faith in biological engineering, is well illustrated in the family history of the Huxley family. Thomas Henry Huxley earned the title of "Darwin's bulldog" for his vociferous defense of evolutionary theory, and his reductionism led him to invent the term "agnostic." His grandson, Aldous Huxley, is best known for his novel *Brave New World*, which remains one of the most lucidly formulated eugenic dystopias to date.

The decline of eugenics was due to both scientific and social events. Even prior to the discovery of DNA, it was becoming clear how little was actually understood about life and heredity. But more importantly, the experience of totalitarianism in Europe shattered the naive faith in progress which was central to the eugenic dogma. Spencer's claim that progress is "not an accident, but is necessary," seemed quaintly outdated after Auschwitz, Nagasaki, or Dresden.

But while moral progress in society is far from guaranteed, the progress of scientific knowledge is more certain. The ethical issues raised almost a century ago by overly-euthusiastic speculative scientists are now being revived by advances in the study of biotechnology. Science has progressed to the point where the dreams of these men are becoming technically possible.

However, it is less than clear whether society is any more capable of dealing with the attenuant social difficulties than it was a century ago. Aldous Huxley, after completing *Brave New World*, admitted that the book contained a serious flaw. In it, he said, "the Savage is offered only two alternatives, an insane life in Utopia, or the life of a primitive in an Indian village, a life more human in some respects, but in others hardly less queer and abnormal. At the time the book was written this idea, that human beings are given free will in order to choose between insanity on the one hand and lunacy on the other, was one that I found amusing and regarded as quite possibly true..."

"Today I feel no wish to demonstrate that sanity is impossible. On the contrary, though I remain no less sadly certain than in the past that sanity is a rather rare phenomenon, I am convinced that it can be achieved and would like to see more of it."

In the next few years, as techniques of biotechnology progress, we will begin to see whether society will conform to Huxley's best or worst case scenario.

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# Dioxin source located in paper process

by Derek Kumm

Some of the concerns over the environmental damage caused by the pulp and paper industry have been squelched. The origin of the toxic compounds 2,3,4,7,8-tetrachlorodibenzo(p)dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF), by-products of paper making process, have been found. It was well known that they were formed during the bleaching process, but the precise reaction was a mystery.

Now, according to Dr. D.G. Gray of the Pulp and Paper Research Institute of Canada (PAPRICAN), the TCDD/TCDF problem "has been solved."

In the paper making process, wood is broken down into its constituent parts—cellulose (paper fibres), lignin (glue that holds the fibres together) and a mess of other chemicals. In white paper, the lignin must be completely removed. The bulk of it is extracted during the pulping (separation of fibres) process. Next the pulp is bleached by a chlorination process. Chlorine gas is bubbled through the pulp mixture. It attacks the lignin, depolymerizes, and loosens the wood fibres. In order to reduce foaming during bleaching, petroleum derivatives called "surfactants" are added.

TCDDs and TCDFs are formed by combining the surfactants with chlorine. Non-chlorinated dibenzodioxins and dibenzofurans are present in surfactants at impurity levels (10 parts per million).

With the discovery of the TCDD/TCDF formation reaction in the paper process, simple solutions can be implemented. These toxic compounds can be eliminated by — switching to surfactants that do not contain dioxins or furans; using chlorine dioxide ( $\text{ClO}_2$ ) as a milder

chlorinating agent or separating the volatile dioxins and furans from the surfactant/pulp mixture.

Canadian paper mills have quickly altered their production methods to reduce the damage to the environment, and because the changes do not require much investment. The cost of such improvements is often the key factor in determining their speed at which the changes are made. Though using  $\text{ClO}_2$  may arrest TCDD and TCDF formation, it does not exclude the generation of other chlorinated organics. These compounds do not occur naturally, so any release to the environment can be suspected to cause problems.

TCDD is the most acutely toxic halogenated aromatic compound. It is the same chemical found in the deadly substance Agent Orange. But, TCDD poisoning does not show any uniformity of symptoms in laboratory tests, nor do symptoms vary with the intensity of exposure.

In studies on U.S. veterans exposed to Agent Orange, low levels of TCDD ranging from 3 to 99 parts per trillion remained in fatty tissues for up to ten years. Again, the studies do not show any specific relation to TCDD exposure and health problems. But this does not discount their toxicity.

In Seveso, Italy in 1976, a chlorophenol plant accident spread TCDDs over an agricultural area. Within 15 days many farm animals died. No human deaths were recorded and no cases of genetic damage were observed. But, a skin condition caused by TCDD exposure called chloracne afflicted many people.

The compound TCDF can be produced by combustion of wood and coal, and during the incineration of industrial wastes such as polychlorinated biphenyls (PCB). The presence of PCBs in transformers has received a lot of

bad press, but the compound does not actually pose a threat at trace levels. The danger of PCBs is due only to the formation of TCDFs by improper incineration.

The discovery of the origin of TCDDs and TCDFs is likely to remove the most toxic by-products of the paper process. But this does not mean that the process is now

entirely safe for either people, or the environment. Stringent measures must still be taken to dispose of industrial waste responsibly.



hyde park

## Teaching Assistant grievances

In the last ten or fifteen years Teaching Assistant (TA) salaries have not been a priority for McGill, and the result has been a considerable reduction of the real value of the TAship. The results of the Post Graduate Students Society (PGSS) TA committee survey in 1988 clearly indicated major differences in the rates of pay for TA's in different departments, overwork in many departments

and considerable dissatisfaction in many areas. These problems stem from insufficient funds allocated to TA salaries, insufficient numbers of TAs employed (so that some TAs have to work far more hours than stated in their conditions of employment), and often delays in payment.

In some departments, notably in the Arts and Humanities, TAs often provide the major or only

means of support for graduate students. Deteriorating salaries and too few TAships particularly harm these students and those they teach.

The imminent tuition fee hike present another threat to TAs livelihoods, and unless McGill makes TA conditions a major priority for any new funds from increased revenues, the future for McGill TAs will be bleaker than ever.

If you are a TA and have a grievance about the way you are being treated, or have any suggestions for improving the conditions of employment in your department get in touch with the TA committee at Thomson House.

James G. Owen PhD3  
(on behalf of PGSS TA committee)

## The Church of St. John the Evangelist (Anglican)



137 President Kennedy

Métro Place-des-Arts

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Friday February 2

## The Presentation of Christ and The Purification of St. Mary The Virgin (Candlemass)

Come and join us for an experience of the "High Church" Anglican Liturgy Procession and Solemn High Mass:

5:45 p.m. Friday

Sunday High Mass: 10:30 a.m.

## The McGill Daily

Proudly announces the conception of its' annual smash

## Lesbian and Gay Issue

To Appear: Tuesday, February 13th

Deadline for Advertisements: Friday February 9th



# Vision et intelligence artificielle à McGill

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*La recherche dans le domaine de l'intelligence artificielle est très active. A McGill, le Centre de la Recherche sur la Machine Intelligente fait sa part.*

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**M**e voici au quatrième étage du McConnell Engineering building. Les rénovations terminées il y a à peine quelques semaines ont complètement changé les lieux. J'avance à pas pressés dans ce décor moderne. Une passionnante discussion m'attend avec le jeune et dynamique professeur Ferrie, chercheur en vision par ordinateur, intelligence artificielle et conception des systèmes ici à McGill.

Distrain, je fais soudainement face à un écran vitré. Le « Centre McGill de la Recherche sur la Machine Intelligente ». Avec un titre pareil, je m'attendais à bien des surprises. Bien au fait que les robots contemporains ne sont en fait que de vulgaires manipulateurs, j'étais toutefois bien curieux de découvrir ce qui se mijotait au creux de nos ingénieux cerveaux.

Gavé de récits de science fiction, j'espérais, sans me l'avouer, rencontrer au détour d'un corridor quelconque humanoïde agile et volubile, ou peut-être simplement une banale poubelle déambulante, sifflant une poésie toute technologique... Vous savez, le genre de rencontre à laquelle on peut s'attendre quand on se balade dans un vaisseau spatial. « Beam me up, Scottie! », je ne suis pas sur la bonne planète. Pas de R2D2 à l'horizon. Les robots serveurs sont encore bien embryonnaires, en gestation dans des cerveaux pourtant très fertiles.

Ce vocabulaire biologique est loin d'être inapproprié. La recherche sur l'intelligence artificielle requiert une compréhension approfondie de la physiologie humaine. L'activité humaine la plus simple est d'une complexité effarante lorsque transposée à la machine. Le nombre d'opérations effectuées par les différents systèmes humains est exceptionnellement grand. Les plus simples raisonnements combinent un nombre inimaginable d'informations ce qui rend la tâche des

chercheurs d'autant plus problématique. L'approche cartésienne, déterminative et de causalité est exploitée à fond dans l'expression et la recherche des algorithmes de la raison ou même plus simplement de la perception.

La perception est en effet l'une des trois aires de travail du Centre McGill de la Recherche sur la Machine Intelligente (McRCIM), les deux autres étant la robotique et les systèmes (Systems and Controls). Les recherches sur la perception se font principalement sur les thèmes de la vision et de la parole. Le simple défi de reconnaître les formes pour permettre à un robot de les manipuler adéquatement en est un de taille, nous avoue le professeur Ferrie. Aussi, il n'hésite pas à affirmer que l'intelligence artificielle est encore à ce jour un domaine d'exploration privilégié.

## Le centre de recherche

La création McRCIM remonte à 1985. Atteignant maintenant sa pleine maturité, le centre intègre désormais plus de quinze années de recherche dans plusieurs domaines de pointe. Celle-ci se fait actuellement dans des secteurs d'importance stratégique tels que l'intelligence artificielle, l'automatisation et la robotique. La volonté interdisciplinaire du centre se manifeste clairement dans la composition de son personnel de recherche recruté dans les départements de génie électrique et mécanique, l'unité de génie bio-médical et l'Ecole d'informatique, tous de l'Université McGill. Pour certaines questions, on fait également appel à d'autres disciplines telles que la médecine dentaire, la physiologie et même la psychologie.

Les ressources humaines, au dire même de l'organisation, constituent le véritable atout du centre. En effet, 16 chercheurs encadrent en moyenne 90 étudiants de deuxième et troisième cycle. Ce personnel s'appuie sur une infrastructure matérielle composée d'un réseau informatique comprenant de nombreux postes infographiques. Ce réseau permet aux

chercheurs de travailler de façon interactive sur une collection de problèmes allant de la géométrie des modèles CAO jusqu'à la géométrie fractale. Ce réseau est aussi connecté à plusieurs robots de tailles diverses ainsi qu'à de nombreux périphériques.

Les chercheurs ont aussi à leur disposition une importante bibliothèque de logiciels acquis sur le marché, provenant de banques universitaires, ou développés sur place. Parmi ceux-ci, on peut trouver des logiciels de programmation et de simulation de systèmes robotiques, de logiciels de traitement d'images et des systèmes pour l'intelligence artificielle.

Parmi les projets importants, on peut citer: mécanique, modélisation et commande de robots manipulateurs, automates à état finis, commande de procédé, planification de trajectoires robotiques, systèmes d'inspection automatique, imagerie bio-médicale, interfaces réflexifs intelligents, etc.

Des recherches de nature plus fondamentale se font en théorie des systèmes, reconnaissance de formes, processus visuels, structure des tissus musculaires, mécanismes, architecture des robots non-anthropomorphes, organisation des systèmes en boucle fermée, traitement de l'image et modélisation géométrique. Ce travail de recherche est essentiel.

## La vision par ordinateur

Le professeur Zucker, chercheur en vision algorithmique et perception, établit des théories de la perception visuelle. Celles-ci, sous forme de modèles mathématiques, sont à la base de l'application. Suivant la classique méthode scientifique, ces théories sont ensuite vérifiées par l'expérimentation. Ces expériences peuvent inclure des simulations par ordinateur. Les incohérences de la théorie et de la pratique sont ensuite prises en considération pour les modifier. Ensuite, l'ingénieur entre en jeu.

Le professeur Levine, chercheur en vision par ordinateur, en interprétation automatique

des images bio-médicales, en robotique et en capteurs, voit aux modalités d'application des modèles développés.

Le professeur Ferrie est responsable de la construction de la machine qui fonctionne selon ces modèles. Il travaille à la conception des systèmes et des capteurs nécessaires à l'accomplissement des algorithmes. Parmi les équipements spécialement conçus à cette fin se trouve une banque de processeurs parallèles. La quantité d'information à traiter simultanément étant énorme, il est devenu nécessaire de faire appel à de tels systèmes. C'est cette approche technique particulière qui a été privilégiée par l'équipe du McRCIM.

En effet, de nouvelles technologies sont actuellement développées à travers le monde. Les réseaux neuraux sont, à l'avis de plusieurs spécialistes, beaucoup plus aptes à l'exécution des algorithmes de la raison puisque leur architecture est directement inspirée de la structure même du système nerveux. Des simulations par ordinateur des fonctions de bases du cerveau fondées sur cette technologie existent déjà. Certaines banques les utilisent pour lire les montants écrits à la main sur les chèques. Les firmes de courtiers les emploient pour prédire les mouvements des prix des actions et les militaires leur font confiance afin de distinguer les amis des ennemis sur les champs de bataille HiTech.

Egalement, des processeurs analogiques nouvellement mis au point pourraient être utilisés pour l'implantation de l'intelligence artificielle. La technologie employée à McGill, quoiqu'extrêmement puissante, est toutefois dans la ligne classique.

## La recherche fondamentale

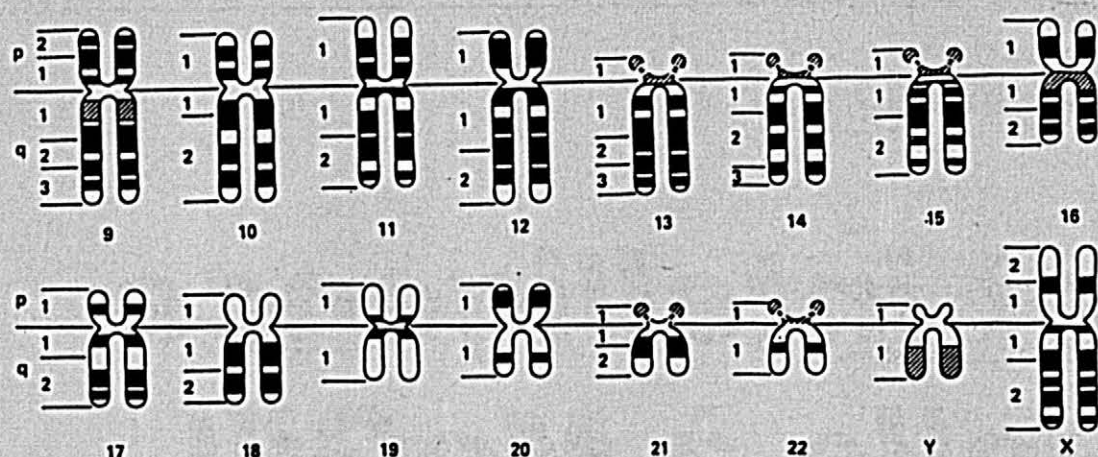
Bien que n'étant pas directement relié au McRCIM, donnons un exemple de recherche fondamentale menant à des développements de la perception artificielle.

Né de parents américains, David Hubel a grandi à Montréal. Son père était chimiste et,

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**Luc Sirois**





Banding patterns of chromosomes 9 to 22, X, Y.

## McGill-MIT conference on biotech

*The third annual McGill-MIT Pugwash conference, held at McGill from January 18 to 21, focused on the social and ethical problems presented by the emergence of biotechnology. Most of the discussion emphasized the need to regulated its use so the field could develop adequately without simultaneously damaging society.*

*Biotechnology is a blanket term for areas of applied biology, like bio-engineering or recombinant DNA technology. Most of the work includes manipulation of genes, the central vehicle of inheritance.*

by Heide Grobe

The best known area of biotechnology is that of recombinant DNA technology. This gives scientists the ability to identify a specific sequence of nucleic acids (i.e. a gene) and insert this sequence into other cells. Because the genetic code is almost universal, other organisms can translate the genetic information contained in a gene.

For example, the genetic sequence for human insulin can be inserted into *E. coli* bacteria. The insulin gene becomes incorporated into the DNA of the *E. coli*. The bacteria will begin producing insulin, allowing for the development of large quantities of low cost insulin. In the past, it had to be extracted from animals.

Other areas of research include the development of genetically-altered bacteria which can act as pesticides for specific species, and the use of gene therapy — the search for the genetic "flags" for genetic diseases, so that these flawed sequences can be corrected.

These areas of study are all very promising, but they come with a host of problems for both scientists and the people who will be affected by the technology — virtually all of us.

Some of the most important issues were discussed in panel format at the conference.

Should we allow human genome manipulation? was the topic of the first panel discussion. McGill doctor Rema Rozen described current research in medical genetics aimed at identifying the genes responsible for inherited diseases. The goal of this research, according to Rozen, is to some day be able to diagnose a disease before a person actually contracts it. This could be done as early as the prenatal stage.

The research, she said, involves the technique of somatic gene therapy. This involves the introduction of a gene into a mutant cell. But, at this point, scientists are uncertain to where the new gene will integrate in the host DNA. Germ line therapy, another technique, is even more risky because genes are inserted at the embryonic stage and are passed on to all succeeding generations.

Given the nature of this research, said Rozen, there is still much work to be done before human experimentation is attempted.

Dr. Benjamin Freedman, of McGill's Centre for Medicine, Ethics and Law, asked the most basic question about his colleague's work: "How should we allow this?" Somatic gene therapy, he said, is a take-off point for a new stage in human history, because it involves the direct manipulation of ourselves, as human beings.

Conventional research protocols cannot be relied upon to govern this field, since they are merely guidelines, not substantive ethical principles. Freedman said the full implications of this technology are not being adequately addressed. The main problem is that regulation decisions are being left up to field specialists, instead of those who have broader concerns about the technology.

Rozen said more public education and critical analysis are needed to involve a broader stratum of individuals in such decisions.

What are the hazards of releasing genetically-engineered organisms into the environment? Professor Stuart Hill, an entomologist from McGill's MacDonald College, asked, "Do we need biotechnology at all?" Many technologi-

cal solutions to environmental problems are merely treating the symptoms and not the disease, he said.

"People don't get headaches from a lack of aspirin in the blood. But we take this medication, without realizing that the pain could be due to tension or lack of sleep and that by modifying our way of living, we could get rid of the headache without the pills."

His view is that preventative cures which work within the ecosystem are needed to sustain the environment. External, band-aid solutions offered by technology can often alter complex ecological interrelationships and damage the ecosystem.

Releasing micro-organisms in the environment as pesticides or herbicides is a serious risk because there is insufficient data to adequately forecast the full impact. Furthermore, current regulations are insufficient. Hill said much of life science is concerned with solving a narrow set of problems, but the only way to plan for the future is to consider the integrity of the ecosystem as a whole through what he calls "preventative, multi-faceted, low-risk design management."

Knowledge of the ecosystem itself can provide answers, if people are creative enough to find them. Hill gave an example of how a man found a way to grow trees in the desert. A V-shaped configuration of rocks was arranged around a seed. At night, when it was cooler, the water in the air condensed on the rocks and ran into the hole where the seed was, allowing it to germinate. Fancy irrigation systems were unnecessary — the solution was low-risk and low-cost. Scientific Evaluation Division of the Medical Research Council (MRC) and former chairperson of Canadian Student Pugwash, concluded the conference. He said that the federal government is beginning to respond to the need for regulation.

The Environmental Protection Act is being revised to include the use of micro-organisms in the environment. Also, protocols for somatic gene therapy have been issued by the MRC's Standing Committee on Ethics in Experimentation.

"There is a social drive for biotechnology, and the quest for knowledge and economic progress cannot stop," Rolleston said. "However, this technology can affect not just certain members of society, but everyone. That is why effective guidelines must be established and followed."

## Gene mapping

*Recombinant DNA science and technology at the heart of a revolution scientists are comparing to atomic power. This revolution, already bringing profound changes in everything from the control of atomic power to agriculture, from criminology to medicine, promises to yield enormous benefits.*

*But experts like McGill's Dr. Benjamin Freedman and Dr. Rema Rozen warn that the public may be unprepared for the widespread impact of this new technology.*

BY GABRIEL TORDI

In the last decade a particular application of this technology has come to the fore. Various government and private agencies are preparing for the arduous job of mapping and deciphering the human genetic code — the genome.

This gigantic task, described by one prominent scientist as "the holy grail" of biology, had long been viewed as impossible. But technical difficulties once deemed insurmountable have largely been overcome by several simultaneous developments — the use of automated DNA sequencing machines, the advent of specialized computer systems and the development of new techniques in gene mapping and sequencing. Experts and others are currently debating the scale, or-

ganization and funding of these projects. While these have not yet been decided, the ethical, social and economic implications have already begun to be debated both within and outside the scientific community. The biological knowledge gained over many of these projects

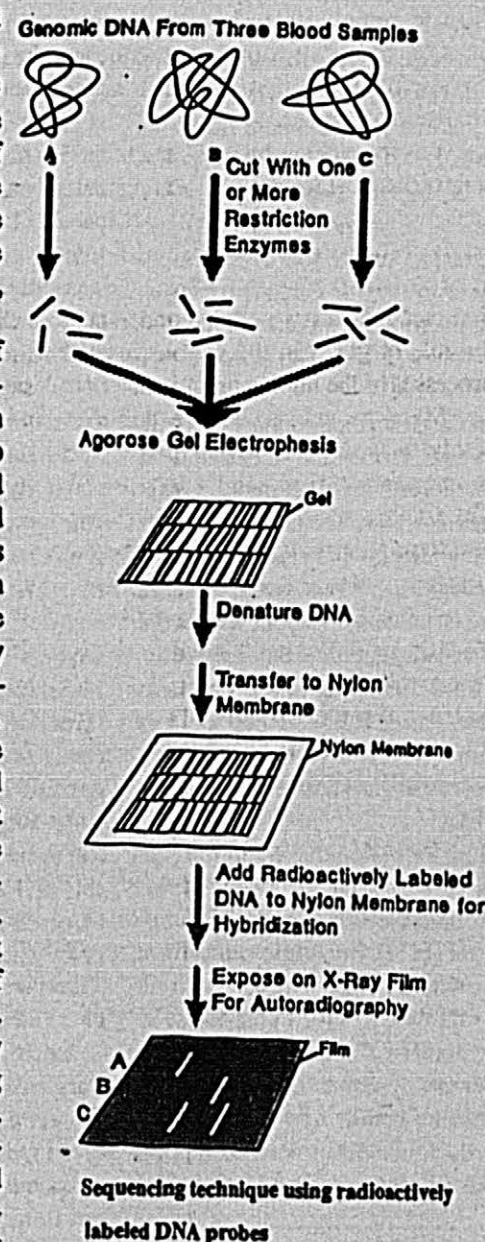
### Genome Projects

Dr. James Watson, who discovered the structure of DNA and is one of the most geneticists in the world, has warned of possible dangers from the technology — the human genome project. "You do not want a genetically damaged child," he said in 1988. Watson, of Washington's National Institutes of Health (NIH), is leading one of the biggest biological projects in the world. The genome project calls for sequencing the entire human genome within the next fifteen years. At current prices it would cost \$3 billion to sequence the 3 billion base pairs making up the human genome. But according to the U.S. Department of Energy's Office of Technology Assessment, sequencing could drop to about \$200 million in the next few years. Watson's large-scale effort requires setting aside 3 per cent of the federal budget with the ethical issues in mind.

The NIH project, only the biggest among currently underway. The U.S. Department of Energy, the National Science Foundation and the Howard Hughes Medical Institute, as well as a number of academic and charitable organizations are involved in sequencing projects in the United States. Interest has also grown in launching the Human Genome Organization (HUGO) by Canada's National Research Council co-ordinating its efforts with the U.S. McGill's Biotechnology Centre is prominently involved in these efforts, with the U.S. and other countries.

### What's in a Gene?

A genome is the





# g: a brave new biology?

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dowment of an organism. The mapping and sequencing of the human genome is equivalent to deciphering the complete hereditary essence of a human being. Our genes lie enclosed and wrapped in the 46 chromosomes which inhabit almost every cell in our bodies. Mapping involves defining the location of a particular gene in a given chromosome. Comprehensive maps already exist for much of the human genome, many of which have played a vital role in medical diagnostics. With the knowledge derived from these genetic maps, a variety of single gene diseases, such as Huntington's disease, can be spotted either before or after birth.

The genes themselves are composed of strings of DNA molecules shaped in a double helix, like two intertwining staircases. These are joined together at recurring intervals by complementary pairs of nucleotides (four in all, labeled A, C, G, and T). Each of these nucleotides can only bind with a definite opposite member. Sequencing involves extracting chromosomes from sample cells and unravelling the strings of DNA to determine the exact order — the "sequence" — of these pairs constituting the 50 000 to 100 000 genes of the human genome. Because sequencing traces the order of base pairs at the molecular level, along the DNA spiral, it provides a higher resolution picture of the genome than does mapping which proceeds at the coarser chromosomal level. To date, some 1 500 to 2 000 genes have been sequenced. It is the exact sequence of these base pairs that geneticists are so anxious to decipher.

But sequencing by itself sheds little light on human biology. Correlating these sequences to protein structure and function is also necessary if the information is to be of real use. Only with this information can geneticists perhaps understand the role of genes in the various myriad processes of the human organism.

Many geneticists believe that successful mapping and sequencing would be enormously beneficial. Most important diseases, such as cancer, have a genetic component — not to speak of the thousands of hereditary diseases themselves. Rozen said that adequate knowledge of an individual's genetic weaknesses would allow for preventative treatment. Compensatory diets and awareness of environmental risks could improve the individual's health and extend his or her life.

But the benefits could transcend even this major achievement. With the creation of a comprehensive data bank of findings, a new conceptual framework could be provided to guide future research and stimulate further advances in fields such as human gene therapy (the transplantation or production of human genes to cure diseases), pharmaceuticals, evolutionary biology, and human physiology and development.

Yet many scientists are wary of these plans. Some fear that traditional small group research in molecular biology will be threatened by the apparent Big Science scale of genome projects and drain away resources from valuable smaller and more

widespread work. "My plea is simply that we think about this project in light of what we already know about eukaryotic genetics and not set in motion a scientifically ill-advised juggernaut", said Dr. Joseph Gall of the Carnegie Institute of Washington.

According to Rozen, over 90 percent of the genome might be composed of "stuffer" sequences of redundant or non-coding DNA. Skeptics thus question the value of massive sequencing and recommend efforts be limited to homing in on known strategic or clinically important sections of the genome.

## Ethical Issues

Because genomic sequencing and mapping have existed for a long time, questions as to whether we should sequence are now moot. Current discussions have focused on issues of scale, cost and organization — who should lead the effort and if the entire genome should be sequenced. Debates on the consequences of genomic sequencing have centred on such questions as potential commercialization, proprietary rights to the information gathered and threats to free and open disclosure of research findings.

But some people remain apprehensive of the wider social impact of this research. In 1986, Whitehead Institute Director David Baltimore said, "The idea (of complete genomic sequencing) is gaining momentum. I shiver at the thought."

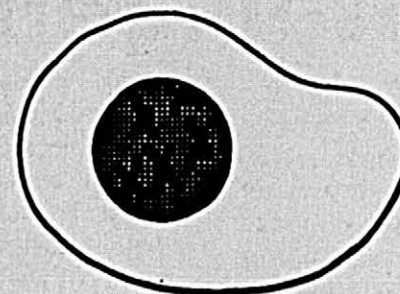
Concerns over what may lie ahead have been amplified by recent controversies about the use of genetic screening. Cases have been reported in which employers have turned down applicants diagnosed as having sickle cell anemia and other conditions. Opinions expressed in the *Journal of Occupational Medicine*, say genetic screening makes good business sense because it could "lead to reduced absenteeism, increased productivity, and decreased expenditures for workers' compensation and group health insurance." Insurance companies have also voiced interest in genetic screening.

Issues of consent, selection of subjects and confidentiality have dominated present discussions on ethical issues related to the genetics revolution in general. Specific dangers of gene therapy have also been addressed. Most scientists agree that gene therapy through the manipulation of the germ line (the hereditary material we pass on to our children) should not be attempted at this time.

According to Freedman, experts are "bereft of imagination" and have not asked "important basic questions." They don't fully recognize the revolutionary character of present technologies and have narrowed the range of debate. He cites a prominent American colleague's view that "no interesting new ethical questions" are raised by human gene therapy — a therapy that could be greatly facilitated by genomic sequencing.

The genetics revolution, he said, should be approached with a feeling of awe. More basic philosophical questions

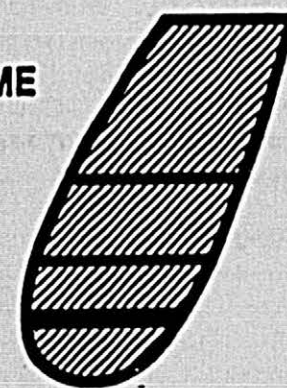
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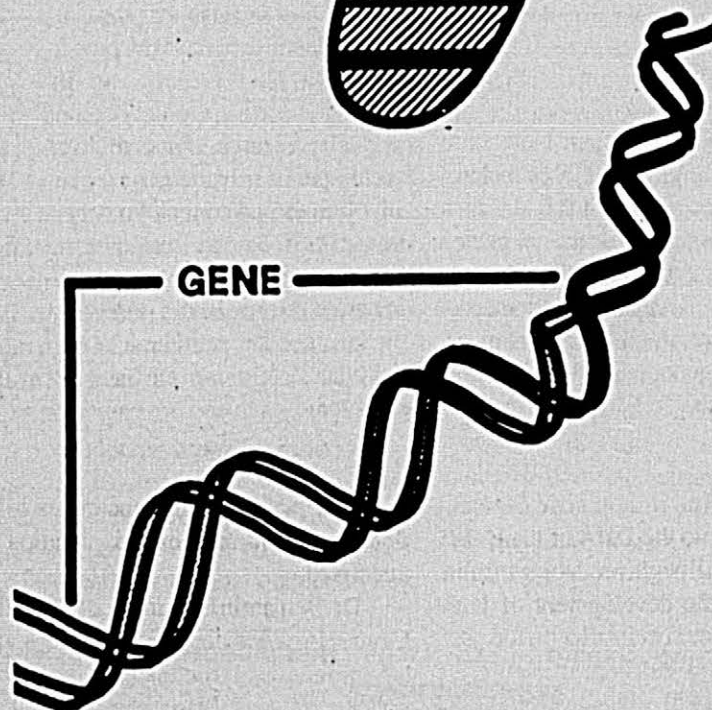
CHROMOSOME



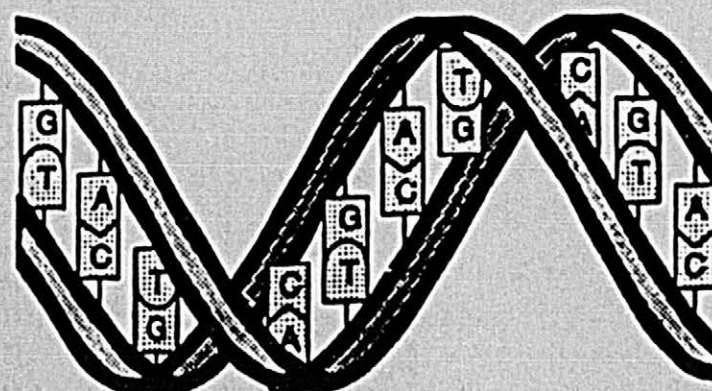
CHROMOSOME  
FRAGMENT



GENE



NUCLEOTIDE BASE PAIRS



such as "what it is like to be human" need to be asked.

The bewildering scope and complexity of this new technology and its social consequences compels ever more urgently the need to improve education and heighten public awareness if discussion is not to be monopolized by experts. The

staggering growth of biological knowledge may reinforce tendencies to "biologize" social problems and encourage a further retreat from the difficult job of understanding the problems confronting us.

We may again run the risk of becoming victims of our own knowledge.



# ... Intelligence artificielle à McGill

suite de la page 3

encore enfant, Hubel a lui-même exploré les joies de la chimie. Bourrant un petit canon de cuivre avec du chlorure de potassium et du sucre, il a vérifié leurs percutantes propriétés à l'extérieur, dans la rue. Une visite de la police a mis un terme à ces études.

Après avoir terminé un baccalauréat en physique à l'Université McGill, il fut grandement intrigué par le monde de la rhédecine. Il s'inscrit donc à l'École de Médecine de McGill, sans jamais avoir suivi de cours de biologie. Ses recherches ultérieures, faites en collaboration avec le professeur Wiesel, leur valurent le prix Nobel de physiologie et médecine de 1981. Leur sujet: la vision humaine.

Les deux neuro-scientifiques ont centré leur attention sur le cortex visuel primaire, une région située derrière le cerveau et connue comme traitant l'information enregistrée par les yeux. Le cerveau transforme ces informations brutes en images. Mais comment une cellule du cerveau accomplit sa tâche particulière était un mystère total il y a 35 ans. Dans les trente dernières années, Hubel et ses collègues ont découvert comment l'information visuelle est analysée et réorganisée.

Ce qu'ils ont trouvé, c'est, selon les dires mêmes de Hubel, « une intrigante édification de colonnes ordonnées ». Les cellules sont arrangées selon leurs tâches spécifiques. Contrairement aux cônes et bâtonnets de la rétine, qui ne font que répondre à la lumière et à la noirceur, les cellules du cortex extraient seulement certains détails: forme, couleur, mouvement, distance ou texture, à l'intérieur de l'image.

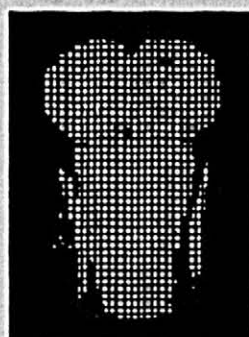
Chaque cellule accomplit sa fonction pour un seul point de la scène visuelle projetée sur la rétine. Les cellules aux tâches similaires, apprirent Hubel et Wiesel, étaient littéralement empilées en colonnes précises à l'intérieur du cortex visuel. Ne répondant qu'à des combinaisons exactes de signaux, ces colonnes du cortex visuel ne sont rien de moins que « les pièces du casse-tête de la perception », annonce Hubel.

## La recherche appliquée: le laser Rangefinder

Afin d'effectuer efficacement les opérations de perception visuelle, l'utilisation de caméras de télévision classiques, même jumelées à la manière de deux yeux, cause beaucoup de problèmes. L'évaluation des distances par exemple est difficilement accomplie. C'est pourquoi les ingénieurs du McRCIM sont appelés à concevoir différents types de capteurs. Parmi ceux-ci, le laser Rangefinder est exploité à fond.

La figure 1 présente une vue schématique de l'appareil. Selon la distance du point de la surface sur lequel se fait la mise au point, le faisceau laser sera réfléchi plus à gauche ou plus à droite sur le détecteur. La distance de chacun des points visés par l'appareil est donc associée à un point sur un axe réel. Puisque l'on connaît les coordonnées du point visé, on connaît donc toutes les coordonnées en trois dimensions de chacun des points de cette surface. On peut ainsi la reconstituer, comme on l'a fait à la figure 2.

La première illustration de cette figure est une simple image de télévision. On reconnaît facilement le hibou mais on n'a vraiment aucune information sur les coordonnées



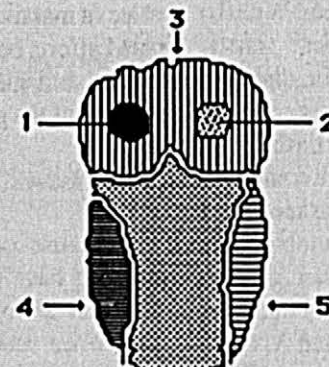
CCD television image



reconstructed surface



extremal points detected



partitioned surface

Figure 2. Un hibou vu par l'ordinateur. Les données recueillies par la caméra de télévision et le laser Rangefinder permettent une analyse détaillée de l'objet observé.

desa surface. La deuxième illustration de la figure 2 est une reconstitution à partir des coordonnées des points recueillis avec le laser Rangefinder. Une telle reconstitution permet une analyse nettement plus puissante de l'objet observé.

## L'analyse des données: l'intelligence entre en jeu

Connaître les coordonnées d'une surface, pour un ordinateur, ne veut absolument pas dire reconnaître l'objet! L'interprétation des données est le véritable défi de l'intelligence artificielle. L'un des buts des chercheurs est la reconnaissance d'objets à partir d'une image en deux dimensions. Les précédents systèmes de reconnaissance dans le domaine de la vision par ordinateur utilisaient principalement la méthode du modèle, c'est-à-dire que seulement quelques objets aux caractéristiques très précises relatives à leur forme sont connus par le système.

Toutefois, une nouvelle théorie dans le domaine a fait apparition, la théorie de « Reconnaissance par composantes » (Recognition by components, ou RBG). Cette théorie permettrait la reconnaissance, ou du moins la représentation en mémoire, d'objets non-anticipés. Le McRCIM tente présentement de construire un système de vision par ordinateur fondé sur la théorie RBG, appelé PARVO.

Actuellement, les recherches n'en sont pas à ce point. Les données acquises par les capteurs, tels que télévision ou laser Rangefinder, ne donnent qu'une information indirecte sur la scène observée. Les données recueillies sont souvent ambiguës et faussées par les habituels bruits électroniques et erreurs quantiques. Le but premier de la reconstruction est de déduire une

description stable qui peut être traitée par différentes opérations. Différentes méthodes mathématiques sont employées pour y parvenir.

La figure 3 nous montre une poupée articulée. Les capteurs ont recueilli une image en deux dimensions de la surface de la poupée. Ces données ont ensuite été analysées pour donner naissance au modèle mathématique représenté au centre et à droite. Pour bien saisir

## Et l'avenir...

L'objectif ultime est bien entendu la réalisation d'une machine autonome et dotée de raison. Ces recherches mèneront peut-être un jour à la réalisation de certains rêves: des machines à écrire commandées par la voix qui discuteraient avec vous de votre texte; des robots qui, sans intervention humaine, pourraient concevoir et construire leurs successeurs; des avions qui changeraient de trajectoire face à une urgence et des automobiles qui se conduiraient elles-mêmes. Nous sommes malheureusement loin de tout cela, très loin surtout des poupées ambulantes... « Beam me up Scottie »

Y-Frame Synchronized Laser Rangefinder

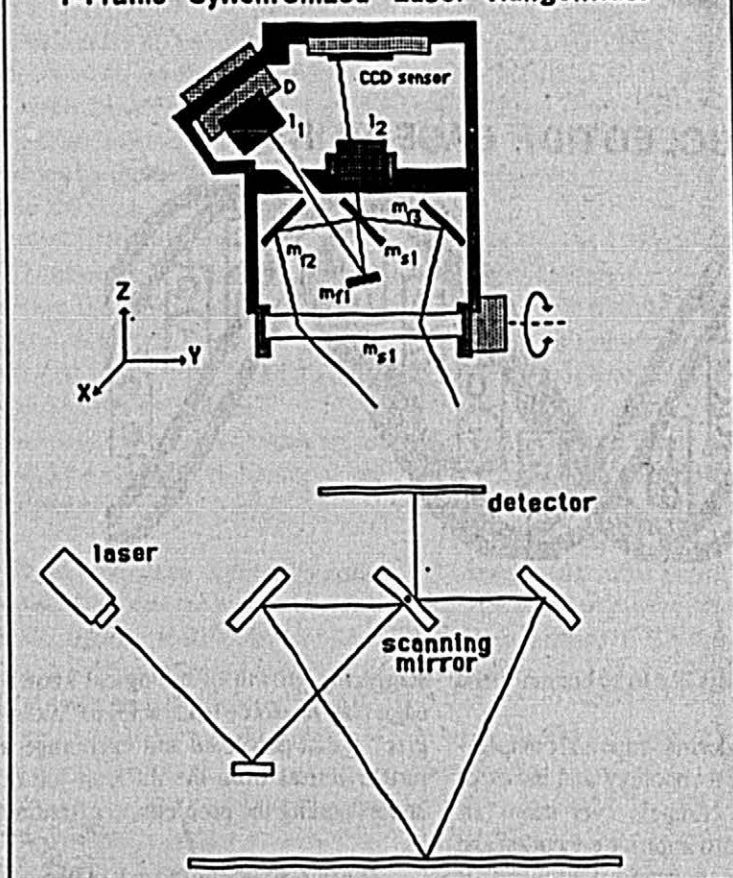


Figure 1. Schéma du laser Rangefinder. Ce capteur est utilisé pour mesurer la distance, lors d'expériences sur la vision par ordinateur.

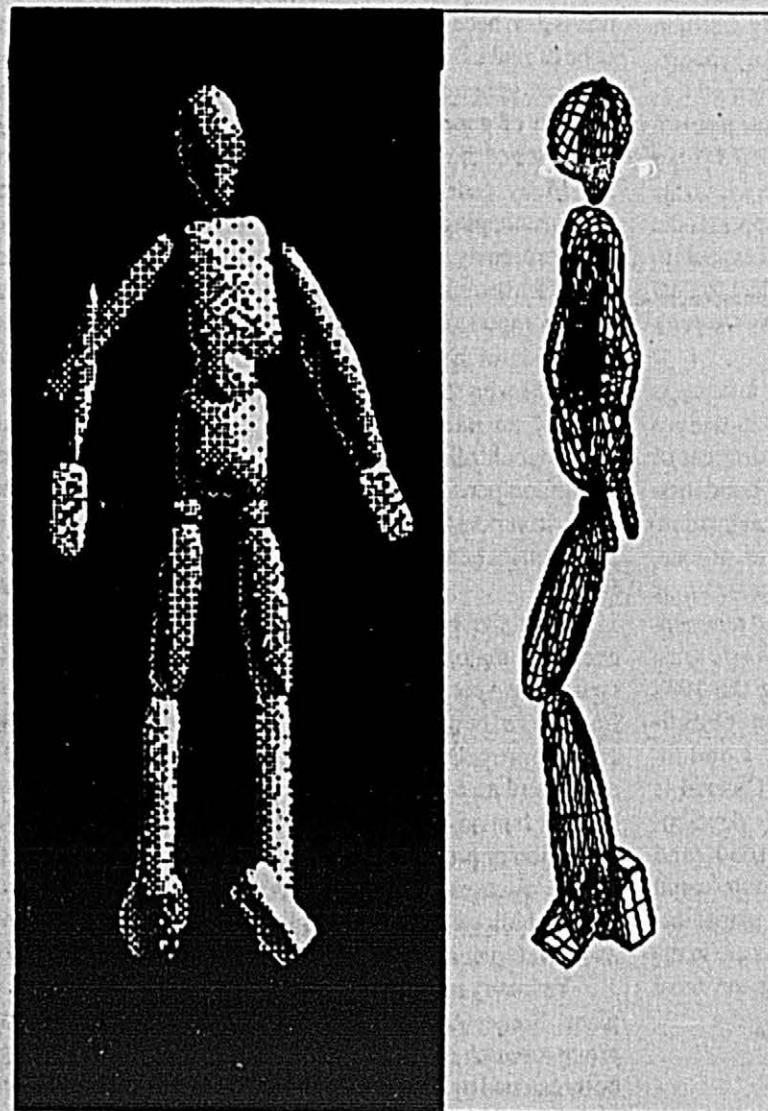


Figure 3. Le pantin articulé. A partir d'une vue en deux dimensions, l'ordinateur parvient à reconstituer l'objet complet sous forme d'expressions mathématiques.



# CLASSIFIEDS

Ads may be placed through the Daily business office, room B-17, Union Building, 9h00 - 15h00. Deadline is 14h00 two weekdays prior to date of publication.

McGill students: \$3.50 per day; \$2.50 for 3 consecutive days, \$2.25 for 4 or more consecutive days. McGill Faculty and Staff: \$4.50 per day. All others: \$5.00 per day. There is a 25 word limit. There will be a charge of 25¢ for each word over the limit. Boxed ads are available at \$4.00 per ad per day - no discounts on boxing. EXACT CHANGE ONLY PLEASE.

The Daily assumes no financial responsibility for errors, or damage due to errors. Ad will re-appear free of charge upon request if information is incorrect due to our error. The Daily reserves the right not to print any classified ad.

## 341 - APTS., ROOMS, HOUSING

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## 350 - JOBS

Paint the town this summer with Triple A Student Painters®: Painters and forepersons needed for West Island District. Sure beats Treeplanting! Call Anthony at 694-7028.

Creative lighting designer/technician needed for entertainment work through the spring and summer. Late night hours. Please call Richard at 345-0509.

Bilingual Receptionist needed to work part-time. \$5.50/hr. Côte St. Luc Area. Transportation can be arranged. Call Flamingos Party 483-5947.

Coast Range (Treeplanting) To those who left their names at Student Manpower, please call Jon 831-8553 for interview. Still looking for other planters as well.

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**Compulsive Eating Workshop:** Share with others your concerns. Become liberated from this obsession. Develop a new relationship with food/a positive attitude. McGill Counselling 398-3601.

## 361 ARTICLES FOR SALE

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## 363 TO GIVE AWAY

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## 372 LOST AND FOUND

**Help! Lost:** a gold ring with Chinese writing (characters) engraved on it; of extreme sentimental value. Please call 939-5767.

**Found In Brionman 1 - Blue Scarf,** left on Tuesday Morning early January. 939-1328.

**Found Thursday, Jan 30 - Night Woman's Seiko watch.** Outside Currie Gym. Call Guy 485-1236.

**LOST: Large Triangle Pendant,** McGill Area. Boyfriend will strangle me if not found. Have pity and get a huge reward: 932-0665.

## 374 - PERSONALS

Frosty says...

"I'm no granola."



**GERT's:** 10:30 p.m. You're tired but your friends want to stay. Don't want to walk home alone? Use the WALK-SAFE NETWORK!! McL. Lobby Mon - Thurs 10:45 p.m.

**Singing the mid-term blues.** Do your roommates play too much loud Bon Jovi? Can't sleep? Well neither can we! Call 398-6246, 6pm - 3am. Nightline, cause it's confident, anonymous and cool!

**What is Trusting in God?** McGill Christian, along with Pastor Ken Bombay, explore this topic on Friday, February 2nd., 19h30 Presbyterian College's Chapel.

**Engineering blood bash** is being held on Friday (Feb. 2) Happy Hour 8:30 - 9:30.

**Chance of winning \$200.** Decision making study - one hour long. McGill Psychology Department. Wendy 482-9728.

**Rock n Roll Picnic II.** Me, Mom + Morgentaler with the Ripcordz & the Elementals. Friday, February 9, Ballroom 8 p.m. \$5.50/\$4.50 with McGill ID.

**Burning Down the House!!!** 2nd annual party at Beta Theta Pi, Friday, February 2nd. 3647 University. 2 for 1, two for one.

## 383 LESSONS OFFERED

**Learn French** with a qualified teacher. Best Proven method \$20.00 hour. Atwater/De Maisonneuve. 831-7682.

## 385 NOTICES

**Gays and Lesbians of McGill** offers an information and counselling talkline. Call us with questions, problems, or just to talk. Phone 398-6822 or drop by Union 417, M-F, 7 - 10 p.m.

**Lesbian/Gay studies group** meets Thursdays, discussion group meets Fridays, both at Yellow Door (3625 Aylmer) 17h00. Info 597-0363 (Bill).

**Animals are suffering** confinement and death in the hands of us humans. Help work to improve their fate. META 276-0914.

**President Caught Streaking** across Campus! Just kidding... but since you've read this far, The Red & White Ball will prove to be even more fun than this joke - see for yourself Friday, March 23. Tickets on sale at Sadies until March 16. \$38 per person.

**Call for Papers II** McGill Journal of Political Economy is accepting all papers of an economic facet for Spring publication. Submit to ESA box, Economics Department.

**Another Spectacular Tropical Bash!** Reggae, calypso, house, caribbean food. Friday Feb. 2, Union B09/B10, 9 p.m. Admission \$4 - All are welcome. Info: Andrew - 848-9382

**Union Ballroom, Saturday Feb. 3rd, 8:00 p.m.** Gert's Ski Club Party, all students welcome. 4 for 5 refreshments all night, plus first run ski movies, D.J. Door Prizes, etc.

**Norwegian Knitting Raffle:** Mittens & head bands. Tickets on sale in Union Lobby in 1st week of February. Draw will be Feb. 7 at 5:00 p.m.

## 387 VOLUNTEERS

Had a religious, mystical or otherwise extraordinary experience? We want to hear about it. Leave number or address: Religious Experience Research Project, 3520 University, Montreal, Quebec.

**Female Students** In engineering, physical sciences, nursing and engineering needed for psychology study. Involves questionnaires and taking 1 blood sample. Pays \$5.00 Call 939-1213.

## 389 MUSICIANS WANTED

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-Benjamin Franklin

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## CONNING THE CANADIANS

By  
Victor W. Forster

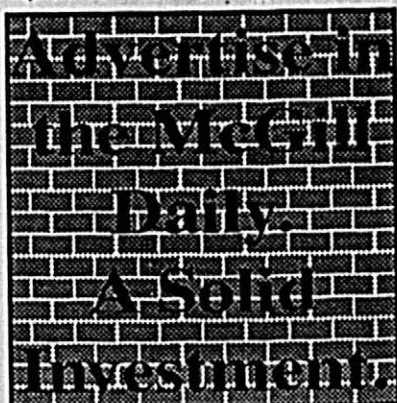
"We shall separate from Canada the same way that Canada separated from England. We shall sever the links one by one; A little concession here and a little concession there ..."

Claude Morin  
Former Quebec cabinet minister.

CONNING THE CANADIANS takes the Meech Lake Accord, section by section, and exposes it as part of "etapisme" the step by step approach to change Canada from a Canadian nation to a Canada-Quebec two-nation federation, WITHOUT THE CONSENT OF THE CANADIAN PEOPLE!

The accord is a Quebec notice to all Canadians  
**THE CONFEDERATION OF YESTERDAY IS AT AN END**

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Salle de bal de l'union des étudiants  
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Chanteurs 12h à 14h  
Danseurs 14h Registration  
Musiciens, Numéros de variétés, Postes techniques 12h à 14h

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**CANADA'S WONDERLAND**



# Senate returns MACES to trusteeship

by Dave McCullough

McGill's administration put the Continuing Education students' association into trusteeship, despite mistrustful cries from student senators.

McGill's Association of Continuing Education Students (MACES), representing 13 000 students, was placed under trusteeship by Senate last Wednesday after its executive members were accused of mismanagement.

Vice-Principal Physical Resources Sam Kingdon accused the MACES executive of nepotism and executive kickbacks. As well, Vice-Principal Academic Samuel Freedman accused MACES of al-

leged "fiscal irresponsibility" since its re-establishment last spring. Kingdon said MACES had no control over their budgeted spending, citing an expected \$42 000 deficit this year.

MACES was also accused of mismanaging its licenced lounge — closed by the city one month after it opened its doors last September.

Most student senators voted against the trusteeship arrangement, in support of MACES and its executive.

According to Students' Society President Santo Manna, "Student associations are elected by our students to act for our students and should not be interfered with by administration. We cannot be treated

like this any longer."

Manna added that although MACES are having difficulties, he believed that "they were shafted."

MACES Student Senator Titi Nguyen said the administration's accusations were "full of holes," as MACES had undergone several internal audits since the election of the current executive. He accused the administration of overstepping its bounds by seizing the association's \$200 000 endowment even before the trusteeship was imposed.

"It's like going to the bank and being asked why you want to take your own money. If you want your money back, you have to beg for it," Nguyen said.

MACES invested its money in government treasury bills through McGill's Treasury Department last July. While \$50 000 of the fund had matured in January, it was re-invested by the University despite protests from the MACES executive.

Nguyen's concerns about the endowment extended to legal guarantees — which kept the money in the administration's hands.

"Legally we have no control over the money. It could end up in the faculty of Arts or even the Principal's office," he said.

A Senate review committee to look into MACES' affairs — struck last November — submitted a report even though the majority of its

members quit.

"It was a sham!" said Nguyen. "We cannot have an impartial committee of peers when conditions are being dictated by one side."

President Johnston openly reprimanded Senator Nguyen, calling his comments "abusive."

As the committee only met once, Manna said it was impossible for the committee to deal with the alleged accusations thoroughly and impartially. "As far as I'm concerned, the committee report does not exist," he said.

The Senate will decide upon the form of the trusteeship and the fate of the association their next meeting in two weeks.

## Daily news briefs

### Study break strikes back

Québec's student association may postpone their strike against the tuition fee hike to rally those who would otherwise simply have enjoyed study break.

ANEEQ will reschedule their proposed strike against Québec's university tuition fee increase from February 21 to the 27, in order to mobilize students whose reading week coincided with the initial strike date.

McGill students can now walk out of their classes as part of a common front action by other Québec students — clearly voicing their opposition to the fee hike while prolonging their study break.

McGill's reading week ends on February 23.

ANEEQ External Affairs officer Jeff Begley said once these students join, they will "have a fairly substantial number of students behind the strike."

McGill students will vote on the strike at a General Assembly on Tuition Fees to be held on February 7 in the Union Ballroom.

ANEEQ will be inviting members of the Québec Students' Federation (FEEQ) — including McGill — at its national assembly on February 10 to determine the strike date.

Concordia and Université de Montréal students will also vote on the strike proposal.

— Dave McCullough & Stephane St-Onge

## events

**Development Week: Tropical Bash**, Fri., Feb. 2, 9:00 p.m., Union B09/10, members \$3.00, non-members \$4.00. Info.: Andrew 848-9382. All welcome.

**Communist League:** Sylvie Charron on "Azerbaijanis Protest of Soviet Troops," Sat., Feb. 3, 7:30 p.m., Librairie Pathfinder, 6566 St-Laurent. Voluntary contribution: \$3.00. Info.: 273-2503.

**Benefit Fiesta for El Salvador:** Sat., Feb. 3, 1511 St-Jacques St. W., corner Guy, 8:00 p.m., \$3.00. CKUT 90.3, Radio McGill: "A l'Ecoute de l'Amérique Latine," Sat., Feb. 3, 12:00 p.m.. Info.: 398-6787.

**McGill Savoy Society:** "Pirates of Penzance" Westmount High School, 4350 Ste-Catherine St. W., \$5.00 students, \$10.00 adults. Feb. 2-3 and 8-10 at 8 p.m. Feb 4 at 5pm.. Info.: 398-6820.

## letters

### To the Daily:

Every Monday night the McGill Debating Union holds a prepared round, open to the student body of McGill. Issues are often controversial and topical. Last Monday night the issue debated was: Is the NDP a spent force in Canada? Mark Lurie, a "reporter" for the *Daily* felt the need to report on the debate without any obvious knowledge of debate as an activity, and without notifying the debaters they were being reported. His report not only misrepresents the McGill Debating Union, his journalistic ethics are at best questionable now.

Mr. Lurie should come to debating meetings more often, or just ask any member about the basic rules of parliamentary style debate. If he did so, there would be basis for his criticisms on debate content and tactics. Mr. Lurie should have asked the debaters their levels of debate as well seeing that the levels and degrees of debate experience varied so greatly. If Mr. Lurie had actually stopped to analyse the debate, he would have seen that the debate was not what he wanted it to be. The entire debate centered on what Stephen Johnson defined as 'spent force', and from there the debate should blossom. To have to stand up, as I am certain Mr. Lurie would from his comments, and deliver a brilliant seven minute speech about the wonders of the NDP, how it want in fact not a 'spent force', and then launch into a fit of rhetoric about free trade, trade unionism

and native rights, is at best difficult for even the best debaters in Canada. But since this is what Mr. Lurie sees as a proper speech in defence of the NDP, I would invite him to do so.

The content of the debate was fluffy and admittedly the government deserved to win. I would like to point out that Ms. McLaughlin's bilingualism was defended, and Joel Hechter said some incredibly intelligent things besides the crippled Indians quote. I am disgusted by the misrepresentation of the debating union and would invite everyone to come out to see what it is all about next Monday.

Mary-Margaret Jones  
BA UfF

*ed note: As any incredibly intelligent person could well anticipate, the Daily generally does not feel obliged to notify speakers in a public forum that their words may be reported.*

### To the Daily,

This year's management carnival showed a tremendous amount of school spirit, faculty bonding, and good clean fun. I would be the last to deny that it is a great part of the university experience. However the scavenger hunt included several items which had to be stolen such as an employee of the month plaque from MacDonalds, a stop sign off of a

school bus, a condom dispenser, an indoor sprinkler, and a Black Label ad from the metro. This is illegal and unethical, and is a pretty stupid thing for anyone to do for the sake of a scavenger hunt. A lack of respect for Black Label and MacDonald property is one thing, but the other items mentioned are safety devices. Maybe next year we can enjoy a spray painting contest on the side of the Bronfman building or a search for the most creative way to break a window with a beer bottle. The points for finding a homeless whino was only in bad taste, but vandalism costs money and is a real pain in the ass. It is embarrassing to find out that it is a part of campus life at McGill.

Chris Sullivan  
Arts

**CAPE**  
**meeting**  
**16h00**  
**Union B-03**  
**Topics include:**  
**the "On February**  
**14th, break**  
**Claude's heart"**  
**demonstration.**  
**All welcome**

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